

STATUS OF THE CLAIMS.

1. (Original) A method of producing thin cast strip with low surface roughness and low porosity by continuous casting comprising the steps of:
 - a. assembling a pair of cooled casting rolls having a nip between them and with confining closure adjacent the ends of nip;
 - b. introducing molten steel having a total oxygen content of at least 100 ppm and a free oxygen content between 30 and 50 ppm between the pair of casting rolls to form a casting pool between the casting rolls at a temperature such that a majority of the oxide inclusions formed therein are in liquidus state;
 - c. counter-rotating the casting rolls and transferring heat from the molten steel to form metal shells on the surfaces of the casting rolls such that the shells grow to include oxide inclusions relating to the total oxygen content of the molten steel and form steel strip free of crocodile surface roughness; and
 - d. forming solidified thin steel strip through the nip between the casting rolls from said solidified shells.
2. (Original) The method of making a steel strip with low surface roughness and low porosity by continuous casting as claimed in claim 1 wherein the temperature of the casting pool is below 1600° C.
3. (Original) The method of making a steel strip with low surface roughness and low porosity by continuous casting as claimed in claim 1 comprising additional step of:
forming a textured surface on the casting surfaces of the casting rolls having a random pattern of discrete projections, having an average height of at least 20 microns and having an average surface distribution of between 5 and 200 peaks per square millimeters.
4. (Original) The method of making a steel strip with low surface roughness and low porosity by continuous casting as claimed in claim 1 wherein:

the oxide inclusions comprised of MnO , SiO_2 and Al_2O_3 are distributed through the molten steel in the casting pool with an inclusion density of between 2 and 4 grams per cubic centimeter.

5. (Original) The method of making a steel strip with low surface roughness and low porosity by continuous casting as claimed in claim 1

wherein: the molten steel in the casting pool is low carbon steel having a carbon content in the range of 0.001% to 0.1% by weight, a manganese content in the range of 0.1% to 10.0% by weight, and a silicon content in the range of 0.01% to 10% by weight.

6. (Original) The method of making a steel strip with low surface roughness and low porosity by continuous casting as claimed in claim 1 wherein:

the steel shells have such manganese, silicon and aluminum oxide inclusions as to produce steel strip having a per unit area density of at least 120 oxide inclusions per square millimeter to a depth of 2 microns.

7. (Original) A method of producing thin cast strip with low surface roughness and low porosity by continuous casting comprising the steps of: a.

assembling a pair of cooled casting rolls having a nip between them and with confining closure adjacent the ends of nip;

b. introducing molten steel having a total oxygen content of at least 70 ppm and a free oxygen content between 20 and 60 ppm between the pair of casting rolls to form a casting pool between the casting rolls at a temperature such that a majority of the oxide inclusions formed therein are in liquidus state;

c. counter-rotating the casting rolls and transferring heat from the molten steel to form metal shells on the surfaces of the casting rolls such that the shells grow to include oxide inclusions relating to the total oxygen content of the molten steel and form steel strip free of crocodile surface roughness; and

d. forming solidified thin steel strip through the nip between the casting rolls from said solidified shells.

8. (Original) The method of making a steel strip with low surface roughness and low porosity by continuous casting as claimed in claim 7 wherein the temperature of the casting pool is below 1600° C.

9. (Original) The method of making a steel strip with low surface roughness and low porosity by continuous casting as claimed in claim 7 comprising additional step of:

forming a textured surface on the casting surfaces of the casting rolls having a random pattern of discrete projections, having an average height of at least 20 microns and having an average surface distribution of between 5 and 200 peaks per square millimeters.

10. (Original) The method of making a steel strip with low surface roughness and low porosity by continuous casting as claimed in claim 7 wherein:

the oxide inclusions comprised of MnO, SiO₂ and Al₂O₃ are distributed through the molten steel in the casting pool with an inclusion density of between 2 and 4 grams per cubic centimeter.

11. (Original) The method of making a steel strip with low surface roughness and low porosity by continuous casting as claimed in claim 7 wherein:

the molten steel in the casting pool is low carbon steel having a carbon content in the range of 0.001% to 0.1% by weight, a manganese content in the range of 0.1% to 10.0% by weight, and a silicon content in the range of 0.01% to 10% by weight.

12. (Original) The method of making a steel strip with low surface roughness and low porosity by continuous casting as claimed in claim 7 wherein:

the steel shells have such manganese, silicon and aluminum oxide inclusions as to produce steel strip having a per unit area density of at least 120 oxide inclusions per square millimeter to a depth of 2 microns.

13. (Original) The method of making a steel strip with low surface roughness and low porosity by continuous casting as claimed in claim 7 wherein:

the molten steel in the casting pool has an aluminum content of the order of less than 0.01%.

14. (Withdrawn) A thin cast strip having low surface roughness and low porosity made by the steps comprising:

a. assembling a pair of cooled casting rolls having a nip between them and with confining closure adjacent the ends of the nip;

b. introducing molten steel having a total oxygen content of at least 100 ppm and a free oxygen content between 30 and 50 ppm between the pair of casting rolls to form a casting pool between the casting rolls at a temperature such that a majority of the oxide inclusions formed therein are in liquidus state;

c. counter-rotating the casting rolls and transferring heat from the molten steel to form metal shells on the surfaces of the casting rolls such that the shells grow to include oxide inclusions relating to the total oxygen content of the molten steel and to form steel strip free of crocodile surface roughness; and

d. forming solidified thin steel strip through the nip between the casting rolls from said solidified shells.

15. (Withdrawn) The thin steel strip with low surface roughness and low porosity as claimed in claim 14 wherein the temperature of the casting pool is below 1600° C.

16. (Withdrawn) The thin steel strip with low surface roughness and low porosity as claimed in claim 14 wherein:

the molten steel in the casting pool has an aluminum content of the order of less than 0.01%.

17. (Withdrawn) The thin steel strip with low surface roughness and low porosity as claimed in claim 14 comprising the additional step of:

forming on the casting surfaces of the casting rolls a textured surface having a random pattern of discrete projections, having an average height of at least 20 microns

and having an average surface distribution of between 5 and 200 peaks per square millimeters.

18. (Withdrawn) The thin steel strip with low surface roughness and low porosity as claimed in claim 14 wherein:

the oxide inclusions comprised of MnO , SiO_2 and Al_2O_3 are distributed through the molten steel in the casting pool with an inclusion density of between 2 and 4 grams per cubic centimeter.

19. (Withdrawn) The thin steel strip with low surface roughness and low porosity as claimed in claim 14 wherein:

the molten steel in the casting pool is low carbon steel having a carbon content in the range of 0.001% to 0.1% by weight, a manganese content in the range of 0.1% to 10.0% by weight and a silicon content in the range of 0.01% to 10% by weight.

20. (Withdrawn) The thin steel strip with low surface roughness and low porosity as claimed in claim 14 wherein:

the steel shells have such manganese, silicon and aluminum oxide inclusions as to produce steel strip having a per unit area density of at least 120 oxide inclusions per square millimeter to a depth of 2 microns.

21. (Withdrawn) A thin cast strip having low surface roughness and low porosity made by the steps comprising:

a. assembling a pair of cooled casting rolls having a nip between them and with confining closure adjacent the ends of the nip;

b. introducing molten steel having a total oxygen content of at least 70 ppm and a free oxygen content between 20 and 60 ppm between the pair of casting rolls to form a casting pool between the casting rolls at a temperature such that a majority of the oxide inclusions formed therein are in liquidus state;

c. counter-rotating the casting rolls and transferring heat from the molten steel to form metal shells on the surfaces of the casting rolls such that the shells grow to include

oxide inclusions relating to the total oxygen content of the molten steel and to form steel strip free of crocodile surface roughness; and

d. forming solidified thin steel strip through the nip between the casting rolls from said solidified shells.

22. (Withdrawn) The thin steel strip with low surface roughness and low porosity as claimed in claim 21 wherein the temperature of the casting pool is below 1600° C.

23. (Withdrawn) The thin steel strip with low surface roughness and low porosity as claimed in claim 21 comprising the additional step of:

forming on the casting surfaces of the casting rolls a textured surface having a random pattern of discrete projections, having an average height of at least 20 microns and having an average surface distribution of between 5 and 200 peaks per square millimeters.

24. (Withdrawn) The thin steel strip with low surface roughness and low porosity as claimed in claim 21 wherein:

the oxide inclusions comprised of MnO, SiO₂ and Al₂O₃ are distributed through the molten steel in the casting pool with an inclusion density of between 2 and 4 grams per cubic centimeter.

25. (Withdrawn) The thin steel strip with low surface roughness and low porosity as claimed in claim 21 wherein:

the molten steel in the casting pool is low carbon steel having a carbon content in the range of 0.001% to 0.1% by weight, a manganese content in the range of 0.1% to 10.0% by weight and a silicon content in the range of 0.01% to 10% by weight.

26. (Withdrawn) The thin steel strip with low surface roughness and low porosity as claimed in claim 21 wherein:

the steel shells have such manganese, silicon and aluminum oxide inclusions as to produce steel strip having a per unit area density of at least 120 oxide inclusions per square millimeter to a depth of 2 microns.